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## Description

So far whippable non-dairy creams are known, which comprise emulsions of an aqueous phase containing optionally one or more milk components and thickener and a vegetable fat phase, which contains vegetable fat and an emulsifier system. However, these creams do not normally contain significant amounts of liquid oils. High levels of liquid oil cause them to be unwhippable with an ordinary domestic, electrical whipper (e.g. a Kenwood-Chef).

In our earlier European patent application 90202076.7 we have disclosed non-dairy creams that may contain 15-60 wt.% of fat, wherein the fat consists of 20-85% of a liquid oil. However, the use of fats consisting of more than 85% of liquid oils is not disclosed.

In Japanese patent application 58116-647 a whippable cream is disclosed, consisting of 0.1-2% of a sugar fatty acid, 0.5-5% of triglycerides having a melting point of at least 50 °C and 0.05-0.5% of pyrophosphoric acid or its salts. The rest of the fat phase may consist of cottonseed oil, palm oil, corn oil or soybean oil. However, in order to make these whippable creams, it is necessary to use sugar fatty acid compounds and pyrophosphoric acid. Moreover, it is not clear from this reference how much of a liquid oil, especially an oil rich in PUFA, can be present in the composition.

From GB 2 162 039, NDC's based on vegetable fats are known that contain a soybean aqueous infusion, a soy cellulose admixed with vegetable oil and/or hardened vegetable oil and alginic acid derivatives or gelatin, a sugar ester and a polyphosphate salt. Therefore, these NDC's always contain a soybean aqueous infusion. Nothing is disclosed about the properties of NDC's having a high content of liquid oils, in particular high PUFA-liquid oils.

In US 3 979 526 whipping creams are described that consist of defatted milk products, e.g. dialysed milk, and a vegetable oil, which are emulsified. However, the products of this US patent do not have a whipped cream structure, but are soft foams.

Japanese patent application 58086-056 describes whippable creams, which are made by pre-emulsifying a particular oil and fat, i.e. with a "rising melting point of 15-45 °C" with quite a lot of milk solids. From this reference nothing can be concluded about the properties of whippable NDC's having a high content of PUFA-rich liquid oils.

GB 2 080 325 discloses margarine emulsions having a fat-continuous phase that are made from emulsions having a water-continuous phase. The fat phase consists partly of globular fats which are coated with a lipoprotein film. Nothing can be derived from this reference about NDC's having a high content of liquid oils.

We have now found whippable NDC's having a high content of liquid oils, in particular of high-PUFA liquid oils. These NDC's are therefore healthier than the known NDC's, while the other properties of these NDC's, like whipping time, overrun, viscosity and firmness, are very satisfactory.

Therefore, our invention is concerned in the first place with a whippable non-dairy cream (NDC) comprising an emulsion of a water-continuous phase, optionally containing one or more protein components, preferably caseinates and optionally thickeners and a fat phase, comprising fat and optionally an emulsifier system, wherein the NDC contains 15-60 wt.% of a substantially globular vegetable fat of which at least 85 wt.%, preferably at least 95 wt.%, consists of a liquid oil and the rest of a hard fat, while the NDC contains 0.005-3.0 wt.% of a food-acceptable salt derived from a divalent, trivalent or quadrivalent metal or alkali earth metal ion and is whippable within 6 minutes, preferably within 4 minutes, when using a domestic, electrical whipper (e.g. the Kenwood-Chef).

The mean droplet size of the fat particles in our NDC's is less than 5.0 µm, preferably less than 1.0 µm.

Although a non-dairy cream that contains CaCl<sub>2</sub> is known (Nestlé's product "Tip Top", which is based on hardened fat having a very low content of unsaturates), CaCl<sub>2</sub> or other salts could not be expected to improve the properties of non-dairy creams wherein very high levels of unsaturated oils are present.

Our NDC preferably contains 25-50 wt.% of fat, while the hard fat can be chosen from the group consisting of palmkernel, hardened palmkernel, coconut, hardened coconut, hardened rapeseed oil, hardened palm oil, hardened soybean oil, butterfat and mixtures thereof. From these fats we preferably use a hardened mixture of palm oil mid-fraction and soybean oil, in particular a mixture of hardened palmkernel of melting point 38 °C and coconut. The two components of this last-mentioned mixture are preferably present in weight ratios of 25:75 - 75:25. Although the fat phase may contain butterfat, we prefer to limit the amount of butterfat in the NDC to a maximum of 10 wt.%, preferably less than 4 wt.%. At least part of the fat may be replaced by well-known fat replacers, e.g. polyol fatty acid polyesters. Examples of these polyesters are described in U.S. Patents Nos. 3,600,186, 4,005,195 or EP Patent Publications Nos. 233,856, 236,288 and 235,836.

The salts of the divalent, trivalent or quadrivalent metal or alkali metal can be any food-acceptable salt derived from Mg, Ca, Al, Mn or Fe. Preferred salts are  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{MnCl}_2$ ,  $\text{FeCl}_2$  and  $\text{FeCl}_3$ . In general, the amount of salt is 0.005-3.0 wt.%, preferably 0.5-1.5 wt.%, based on the NDC. In particular, when salts other than  $\text{Ca}^{2+}$  salts are used, we found that the properties of the whipped creams are very sensitively affected by the amount of salt applied (e.g. when  $\text{Fe}^{2+}$  salts are used).

In the composition also an emulsifier system may be present. This emulsifier system may consist of any kind of known emulsifiers, but preferably Lactodan (= lactic acid esters of monoglycerides; a Grindsted product), lecithins, polyglycerolesters, DATA-esters (= diacetyl tartaric esters of mono- or diglycerides), polyoxyethylene sorbitan esters and/or monoglycerides are used. The most preferred emulsifiers do contain Triodan (= polyglycerolester), lecithin and/or Hymono (= monoglycerides), in particular those that are derived from unsaturated fatty acids or fats. Each individual emulsifier that is used in the NDC, is present in an amount of at least 0.002 wt.%. The total amount of emulsifier used is, in general, less than 0.80 wt.%.

The liquid oil that can be used is normally chosen from the group consisting of sunflower oil, safflower oil, rapeseed oil, maize oil, bean oil, ground nut oil, olive oil, grapeseed oil, walnut oil, hazelnut oil, cottonseed oil, sesame oil, linseed oil or fish oil. We prefer to use liquid oils containing 10-80 wt.% of polyunsaturated fatty acids (= PUFA), 4-18 wt.% of saturated fatty acids (= SAFA) and 12-80 wt.% of mono-unsaturated fatty acids (= MUFA).

The total fat phase of our NDC's preferably displays a PUFA/SAFA weight ratio ranging from 2.5-10.0.

The SAFA-level of the fat phase of our NDC's is preferably less than 30 wt.%.

In order to improve the taste of an NDC it is well known to add some amount of buttermilk component to the NDC. We therefore prefer NDC's that contain up to 10 wt.% of buttermilk powder (BMP).

The NDC's according to the invention may also contain thickeners. As thickeners the following compounds may be used: guar gum, locust bean gum, carrageenan, xanthan gum, alginates, cellulose ethers or mixtures thereof.

We found that, depending on the metal salt used and on the desired outcome, expressed in terms of overrun and Boucher of the whipped product, the amount and type of thickener may vary. However, it is preferred that 0.05 - 2.0 wt.% of one or more thickeners are present in our compositions. The NDC may further contain sugar and flavours.

The whippable NDC's can be obtained by making an emulsion of an aqueous phase containing a protein, an inorganic salt and thickeners and a fat phase containing the emulsifier system. These two phases may be homogenised at about 60°C, after which a homogenised premix might be obtained. This premix is treated with steam, according to a UHT-treatment (i.e. about 2.5 seconds with steam of about 150°C), in order to sterilise the premix.

The sterilised premix is homogenised in one or two stages, after which a sterilised, homogenised product having a temperature of about 60°C is obtained. This product is cooled and stored at a temperature of 5-10°C.

The NDC's having a high liquid oil content so obtained are whippable within 6 minutes. The NDC's according to this invention can also be used for the production of canned NDC's as aerosols, e.g. in the way as described in our earlier European patent application 90307036.5

#### Examples I-VI

Creams were made consisting of the ingredients as mentioned in table I. The  $\text{CaCl}_2$  or  $\text{FeCl}_2$  was added to the cream at 5°C.

Table I

Example	Sunflower oil wt. %	Na-caseinate wt. %	CaCl <sub>2</sub> wt. %	Thickener wt. %
I	45	2	0	0
II	45	2	0	0.2% Guar 0.1% LBG
III	45	2	1	0.2% Guar 0.1% LBG
IV	45	2	1	0.25% xanthan
V	45	2	1	0.5% xanthan
VI	45	2	0.15 FeCl <sub>2</sub>	0.2% Guar 0.1% LBG

After whipping for 5 minutes with a Kenwood Chef, the overrun and Boucher of the whipped creams were measured. The results are mentioned in Table II. It is emphasized that "most desirable results" mean overruns of at least 150% and Boucher of more than 70.

Table 2

Example	Overrun %	Boucher
I	168	< 50
II	107	< 50
III	186	74
IV	228	72
V	171	89
VI	60	59

### Claims

- Whippable non-dairy cream (NDC) comprising an emulsion of a water-continuous phase, optionally containing one or more protein components and optionally thickeners, and a fat phase, comprising fat and optionally an emulsifier system, wherein the NDC contains 15-60 wt.% of a substantially globular vegetable fat of which at least 85 wt.% consists of a liquid oil and the rest of a hard fat, while the NDC contains 0.005-3.0 wt.% of a food-acceptable salt derived from a divalent, trivalent or quadrivalent metal or alkali earth metal ion and is whippable within 6 minutes when using a domestic, electrical whipper.
- Whippable NDC according to Claim 1, which is whippable within 4 minutes.
- Whippable NDC according to Claims 1 and 2, wherein the NDC contains 25-50 wt.% of fat.
- Whippable NDC according to Claims 1-3, wherein the vegetable fat consists at least 95 wt.% of a liquid oil.
- Whippable NDC according to Claims 1-4, wherein the food-acceptable salt is an Mg, Ca, Al, Mn or Fe salt.
- Whippable NDC according to Claim 5, wherein the food-acceptable salt is CaCl<sub>2</sub>, MgCl<sub>2</sub>, MnCl<sub>2</sub>, FeCl<sub>2</sub> or FeCl<sub>3</sub>.

7. Whippable NDC according to Claim 1, wherein the hard fat is chosen from the group consisting of palmkernel, hardened palmkernel, coconut, hardened coconut, hardened rapeseed oil, hardened palm oil, hardened soybean oil, butterfat or mixtures thereof.
8. Whippable NDC according to Claim 7, wherein the hard fat is a mixture of PK 38 and CN with a ratio of the components within 25/75 and 75/25.
9. Whippable NDC according to Claim 1, wherein the thickener is chosen from the group consisting of guar gum, locust bean gum, carrageenan, xanthan gum, alginates, cellulose ethers or mixtures hereof, and which is present in amounts of, preferably, 0.05-2.0 wt.%.  
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10. Whippable NDC according to Claim 1, wherein the protein component is a caseinate.
11. Whippable NDC according to Claim 1, wherein the NDC contains less than 10 wt.% of butterfat.  
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12. Whippable NDC according to Claim 1, wherein lactic acid esters of monoglycerides (Lactodan), lecithin, polyglycerol esters, diacetyl tartaric esters of mono- and/or diglyceride, polyoxyethylene sorbitan esters, monoglycerides and/or mixtures of these are present as emulsifier.
13. Whippable NDC according to Claim 12, wherein the emulsifiers Triodan (= polyglycerol esters), lecithin and Hymono (= monoglycerides) are derived from unsaturated fatty acid or fats.  
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14. Whippable NDC according to Claim 12, wherein less than 0.80 wt.% of emulsifier is present.
15. Whippable NDC according to Claim 1, wherein the mean droplet size of the fat particles is less than 5.0 µm, preferably less than 1.0 µm.  
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16. Whippable NDC according to Claim 1, wherein the liquid oil is chosen from the group consisting of: sunflower oil, safflower oil, rapeseed oil, maize oil, bean oil, groundnut oil, olive oil, grapeseed oil, walnut oil, hazelnut oil, cottonseed oil, sesame oil, linseed oil or fish oil.  
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17. Whippable NDC according to Claim 16, wherein the liquid oil has a PUFA content of 10-80 wt.%, a SAFA content of 4-18 wt.% and a MUFA content of 12-80 wt.%.
18. Whippable NDC according to Claim 1, wherein the PUFA/SAFA weight ratio of the total fat ranges between 2.5 and 10.0.  
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19. Whippable NDC according to Claim 1, wherein the SAFA level of the fat phase of the NDC is less than 30 wt.%.  
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#### Patentansprüche

1. Schlagfähige nichtmilchhaltige Sahne (NMS), umfassend eine Emulsion aus einer wasserkontinierlichen Phase, die fakultativ ein oder mehrere Proteinkomponenten und fakultativ Verdickungsmittel enthält, und eine Fettphase, die Fett und fakultativ ein Emulgatorsystem umfaßt, worin die NMS 15 bis 60 Gew.-% eines im wesentlichen kugeligen pflanzlichen Fettes enthält, von dem mindestens 85 Gew.-% aus einem flüssigen Öl bestehen und der Rest ein Hartfett ist, während die NMS 0,005 bis 3,0 Gew.-% eines für Nahrungsmittel annehmbaren Salzes, abgeleitet von einem zweiwertigen, dreiwertigen oder vierwertigen Metall- oder Erdalkalimetallion enthält und innerhalb von 6 min unter Verwendung eines elektrischen Haushaltsschlaggerätes schlagbar ist.  
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2. Schlagfähige NMS nach Anspruch 1, die innerhalb von 4 min schlagbar ist.
3. Schlagfähige NMS nach Ansprüchen 1 und 2, worin diese 25 bis 50 Gew.-% Fett enthält.  
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4. Schlagfähige NMS nach Ansprüchen 1 bis 3, worin das pflanzliche Fett aus mindestens 95 Gew.-% eines flüssigen Öles besteht.

5. Schlagfähige NMS nach Ansprüchen 1 bis 4, worin das für Nahrungsmittel annehmbare Salz ein Mg-, Ca-, Al-, Mn- oder Fe-Salz ist.
6. Schlagfähige NMS nach Anspruch 5, worin das für Nahrungsmittel annehmbare Salz  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{MnCl}_2$ ,  $\text{FeCl}_2$  oder  $\text{FeCl}_3$  ist.
7. Schlagfähige NMS nach Anspruch 1, worin das Hartfett aus der Gruppe ausgewählt ist, die aus Palmkern-, gehärtetem Palmkern-, Kokosnuß-, gehärtetem Kokosnuß-, gehärtetem Rapsöl, gehärtetem Palmöl, gehärtetem Sojaöl, Butterfett oder Mischungen davon besteht.
8. Schlagfähige NMS nach Anspruch 7, worin das Hartfett eine Mischung von PK 38 und CN mit einem Verhältnis der Komponenten zwischen 25:75 und 75:25 ist.
9. Schlagfähige NMS nach Anspruch 1, worin das Verdickungsmittel aus der Gruppe ausgewählt ist, die aus Guargummi, Johannisbrotgummi, Carrageenan, Xanthangummi, Alginaten, Celluloseethern oder Mischungen davon besteht, und in Mengen von vorzugsweise 0,05 bis 2,0 Gew.-% vorliegt.
10. Schlagfähige NMS nach Anspruch 1, worin die Proteinkomponente ein Kaseinat ist.
11. Schlagfähige NMS nach Anspruch 1, worin diese weniger als 10 Gew.-% Butterfett enthält.
12. Schlagfähige NMS nach Anspruch 1, worin Milchsäureester von Monoglyceriden (Lactodan), Lecithin, Polyglycerolester, Diacetylweinsäureester von Mono- und/oder Diglycerid, Polyoxyethylensorbitanester, Monoglyceride und/oder Mischungen davon als Emulgator vorliegen.
13. Schlagfähige NMS nach Anspruch 12, worin die Emulgatoren Triodan (= Polyglycerolester), Lecithin und Hymono (= Monoglyceride) von ungesättigten Fettsäuren oder Fetten abgeleitet sind.
14. Schlagfähige NMS nach Anspruch 12, worin weniger als 0,80 Gew.-% Emulgator vorliegen.
15. Schlagfähige NMS nach Anspruch 1, worin die mittlere Tröpfchengröße der Fetteilchen weniger als 5,0  $\mu\text{m}$ , vorzugsweise weniger als 1,0  $\mu\text{m}$ , beträgt.
16. Schlagfähige NMS nach Anspruch 1, worin das flüssige Öl aus der Gruppe ausgewählt ist, die aus Sonnenblumenöl, Saffloröl, Rapsöl, Maisöl, Bohnenöl, Erdnußöl, Olivenöl, Traubenkernöl, Walnußöl, Haselnußöl, Baumwollsaamenöl, Sesamöl, Leinsamenöl oder Fischöl besteht.
17. Schlagfähige NMS nach Anspruch 16, worin das flüssige Öl einen PUFA-Gehalt von 10 bis 80 Gew.-%, einen SAFA-Gehalt von 4 bis 18 Gew.-% und einen MUFA-Gehalt von 12 bis 80 Gew.-% hat.
18. Schlagfähige NMS nach Anspruch 1, worin das PUFA/SAFA-Gewichtsverhältnis des gesamten Fettes im Bereich zwischen 2,5 und 10,0 liegt.
19. Schlagfähige NMS nach Anspruch 1, worin der SAFA-Gehalt der Fettphase der NMS weniger als 30 Gew.-% beträgt.

#### Revendications

1. Crème non laitière (CNL) à fouetter comprenant une émulsion d'une phase aqueuse continue, contenant facultativement un (ou plusieurs) composant protéiné et, facultativement, des épaississants, et une phase grasse comprenant une matière grasse et, facultativement, un système émulsifiant, dans laquelle la CNL contient de 15 à 60% en poids d'une graisse végétale sensiblement globulaire dont au moins 85% en poids sont constitués d'une huile liquide et le reste est une graisse dure, la CNL contenant de 0,005 à 3,0% en poids d'un sel alimentaire dérivé d'un ion métallique ou alcalino-terreux divalent, trivalent ou quadrivalent et pouvant être fouettée dans les 6 minutes lors de l'utilisation d'un fouet électrique domestique.
2. CNL à fouetter selon la revendication 1, qui peut être fouettée en moins de 4 minutes.

3. CNL à fouetter selon les revendications 1 et 2, dans laquelle la CNL contient de 25 à 50% en poids d'une matière grasse.
- 5 4. CNL à fouetter selon les revendications 1 à 3, dans laquelle la graisse végétale comprend au moins 95% en poids d'une huile liquide.
5. CNL à fouetter selon les revendications 1 à 4, dans laquelle le sel alimentaire est un sel de Mg, Ca, Al, Mn ou Fe.
- 10 6. CNL à fouetter selon la revendication 5, dans laquelle le sel alimentaire est  $\text{CaCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{MnCl}_2$ ,  $\text{FeCl}_2$  ou  $\text{FeCl}_3$ .
7. CNL à fouetter selon la revendication 1, dans laquelle la graisse dure est choisie parmi le groupe constitué par l'huile de coeur de palmier, de coeur de palmier durcie, de coprah, de coprah durcie, de colza durcie, de palme durcie, de soja durcie, de graisse de beurre ou des mélanges de celles-ci.
- 15 8. CNL à fouetter selon la revendication 7, dans laquelle la graisse dure est un mélange de PK 38 et CN en un rapport de composants compris entre 25/75 et 75/25.
- 20 9. CNL à fouetter selon la revendication 1, dans laquelle l'épaississant est choisi parmi le groupe constitué par la gomme de guar, la gomme de caroube, le carragheenane la gomme de xanthane, les alginates, les éthers cellulosiques ou leurs mélanges, et lequel est présent en des quantités qui sont de préférence comprises entre 0,05 et 2,0 % en poids.
- 25 10. CNL à Fouetter selon la revendication 1, dans laquelle le composant protéiné est un caséinate.
11. CNL à fouetter selon la revendication 1, dans laquelle la CNL contient moins de 10% en poids de graisse de beurre.
- 30 12. CNL à fouetter selon la revendication 1, dans laquelle des esters d'acides lactiques de monoglycérides (Lactodan), la lécithine, les esters de polyglycérol, les esters diacétyltartriques de mono- et/ou diglycérides, les esters de polyoxyéthylène-sorbitanne les monoglycérides et/ou des mélanges de ceux-ci, sont présents à titre d'émulsifiant.
- 35 13. CNL à fouetter selon la revendication 12, dans laquelle les émulsifiants Triodan (= esters de polyglycérol), lécithine et Hymono (monoglycérides) sont dérivés d'acides gras insaturés ou de grasses.
- 40 14. CNL à fouetter selon la revendication 12, dans laquelle moins de 0,80 % en poids d'émulsifiant est présent.
15. CNL à fouetter selon la revendication 1, dans laquelle la grosseur moyenne des gouttelettes des particules de graisse est inférieure à 5,0  $\mu\text{m}$ , de préférence inférieure à 1,0  $\mu\text{m}$ .
- 45 16. CNL à fouetter selon la revendication 1, dans laquelle l'huile liquide est choisie parmi le groupe constitué par l'huile de tournesol, l'huile de carthame, l'huile de colza, l'huile de maïs, l'huile de fève, l'huile d'arachide, l'huile de d'olive, l'huile de pépin de raisin, l'huile de noix, l'huile de noisette, l'huile de coton, l'huile de sésame, l'huile de lin ou l'huile de poisson.
- 50 17. CNL à fouetter selon la revendication 16, dans laquelle l'huile liquide présente une teneur en PUFA de 10 à 80% en poids, une teneur en SAFA de 4 à 18% en poids et une teneur en MUFA de 12 à 80% en poids.
- 55 18. CNL à fouetter selon la revendication 1, dans laquelle le rapport pondéral PUFA/SAFA de la graisse totale se situe entre 2,5 et 10,0.
19. CNL à fouetter selon la revendication 1, dans laquelle la proportion de SAFA dans la phase grasse de CNL est inférieure à 30% en poids.

